

PRICE SIXPENCE.

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&c.



OR

A SERIES

OF

ARTICLES

ON

FOOD,

AND

HOW IT IS DIGESTED.

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DIET AND DIGESTION.

Upon the proper digestion of the food we eat a great deal depends. Is this process good, then we are well nourished; if poor, we literally starve in the midst of plenty. Digestion, in the full sense of the term, must be taken to mean all the processes which go on from the time food enters the body until it is expelled. I intend to show that we have many digestions, such as that which occurs in the mouth, in the stomach, and all along the bowels even to the very end. The various parts of this digestive track being in good condition and performing their functions properly, must result in a well-nourished system, well calculated to last long, and withstand disease. On the other hand, one who has part

or whole of this complicated apparatus out of order, must suffer accordingly; he may eat freely of all kinds of foods, but get little benefit from what he consumes. As a rule, we treat our digestive organs very badly; we cram them too often with food, overload them with all kinds of slops and fluids, introduce into them all sorts of foods and drinks to which they are not adapted, or pour into them irritating drugs that should have no place there.

Some of my readers know that I look upon man as a non-flesh eating animal, and therefore all my arguments will be in favour of a Vegetarian diet, and I shall show the changes that flesh undergoes in the stomach and bowels, feeling sure my readers will then have little to do with it. The digestive organs of man are divided into three sets—those of the mouth, of the stomach, and of the bowels; and all must do their work properly if we wish to be well nourished.

DIGESTION IN THE MOUTH.

In the mouth are found three kinds of teeth. The so-called canines for tearing off the husks of fruit or nuts are at the sides; in front we have the incisors or biters, for taking pieces of suitable size for chewing; whilst at the back we have the most important—the molars or grinders. The molar teeth are situated at the back of the mouth, above and below; they have flat but slightly uneven surfaces, and when food is brought between them, crushing or grinding occurs, and such things are brought with the saliva to a porridgy mass. The first step of digestion is thus seen to be the breaking up of our food into such a state that it can be properly acted upon by the gastric and various intestinal juices. Upon the thoroughness of this process a great deal depends; he who shovels food into his stomach like a stoker does coal into a furnace,

cannot expect to have as good a digestion as he who carefully chews his food before he allows it to enter this organ. Mr. Gladstone is said to give thirty-two bites to every piece of bread that he eats, and I find, on counting the number of times the jaws move, that this is the least we should give it. Make it a rule to bite every bit of food from thirty to forty times before you swallow it, and then you will have done your duty to it, and prepared it for stomach digestion. Another important point in digestion is that the food be thoroughly broken up; thus, if horses are given uncrushed oats, a great many of them pass out of the body undigested; so with whole grain given to cattle, and in human beings, too, we notice this waste. If man wants to absorb most of the nourishment from the food eaten, he must have it finely broken up; if a person eats stewed wheat, a great deal of it will pass unchanged through the bowels; if he eats crushed wheat more of it will be digested; if he takes coarse wheatmeal, more still is absorbed; whilst if he takes finely-ground wheat-

meal he can extract from it all the nourishing matter it contains.

Children and invalids should be given finely-ground foods, as such are more thoroughly digested than the coarser ones; the advantages of these are that they require little chewing, and being in a state of fine division the gastric and various intestinal juices can penetrate and digest most of the available nutriment from them.

Of equal importance to mastication is insalivation or a thorough mixing of the saliva with the food eaten. The spittle or saliva contains a peculiar principle called ptyalin, which has the remarkable property of changing starch into sugar. This is not found in the saliva of the carnivorous or flesh-eating animals. As it does not in any way act on flesh, its presence in our spittle shows that we ought to live on a diet rich in starch. The fact, too, that carnivorous animals never chew their food, and that we do, is an argument against the custom of

flesh-eating by human beings. The practical use of the ptyalin is to convert some of the starch of the food into sugar; this is then readily absorbed from the stomach into the circulation, sets up a feeling of satisfaction, and so we do not overload our digestive organs. Persons who do not properly **chew** what they eat and get it mixed with saliva, swallow unprepared food, and in consequence of some of it not being taken into the blood, they do not readily experience a feeling of satisfaction, and so eat too much. The excess of food eaten lies like a weight in the stomach, causes a dull and heavy sensation, and the person feels hungry though he may have had a large meal. Those who are troubled with these symptoms will do well to eat some farinaceous food at the beginning of the meal, eat it slowly, well mix it with the saliva, and thus give rise to systemic satisfaction before they overcrowd the stomach. Put it in practice thus: Have a small cup of vegetable soup or porridge before the heavier part of your meal, and take a little bread with it, so as to ensure mastication and insalivation.

In Yorkshire they practise the good plan of taking some of the farinaceous part of dinner first. Yorkshire pudding, which is a mixture of eggs, flour, and milk, is the first course, and afterwards come the meat and vegetables. In Norfolk they have a similar custom, the Norfolk dumplings being eaten before the meat. From a digestive point of view both these customs are good, and if all families would make it a custom to eat the farinaceous or milky pudding first, and take a fair amount of brown bread with it, we should have less over-eating, and suffer less from indigestion. When eating soft or spoon food we should always eat a certain quantity of dry things at the same time; by this means we ensure the soft food being mixed with saliva, as the act of chewing the dry stuff forces some of the saliva into the mouth. This mixes with the food, and acts on it as I have above mentioned. This is why soup, porridge, milk puddings, and vegetable stews should always be eaten with dry brown bread or with toast. Some persons tell you that dry foods always agree with them much better than

soft ones. One reason is that the solid foods get properly mixed with saliva and so partly digested, while the softer ones are swallowed hastily, and so not thoroughly prepared for stomach digestion. The quantity and quality of the saliva varies at different times of the day; thus ordinarily only sufficient is secreted to keep the mouth moist, but just before we are going to eat, more is poured out, and our mouth waters, and a still larger quantity is formed whilst eating. That secreted during the meal-time is thick and gum-like, and specially rich in ptyalin. As I said before, the saliva does not assist in the digestion of animal products, as butter, milk, eggs, or cheese; nor does it act on flesh of any kind. It acts more readily on starch that has been cooked than on the raw material; that is why many cooked foods are more easy of digestion and nourish the body better than raw ones.

Here I must protest against eating and drinking at the same time, as such a practice is injurious. The custom of filling the mouth with

fluid whilst we have food in it, leads to imperfect mastication and insalivation, and what is in the mouth is swallowed before it is properly prepared for the stomach, causing indigestion and stomach troubles. The rule of eating must be to eat at meal times, and leave the drinking either to the end, or even until some time afterwards. By obeying this rule we get into a proper mode of eating; neither do we delay digestion in the stomach, as fluids must be absorbed before the proper breaking up of food can go on.

Sir Wm. Roberts, of Manchester, has experimented on the influence on the salivary digestion that certain articles exert if taken with food. He found that all acids delayed mouth digestion. From this we learn that vinegar, pickles, and acid sauces prevent the saliva from acting on the starch in the food, and we are therefore best without them. Tea and coffee, especially the former, also delay the digestion of starch by the saliva; this is a warning to those who soak bread in their tea or coffee. Such a plan

is not good, and those who drink these fluids, should only take them at the end of a meal, and not when chewing their food. Cocoa is not injurious in this way, so that those who have no teeth, and want to soak their crusts, can soak them in this beverage, but not in tea or coffee, otherwise mouth digestion will not occur. Beer, stout, cider, ale, porter, and such like malt drinks delay mouth digestion; the more acid they are, the more they retard it. This argues that these alcoholic liquors taken whilst food is in the mouth are not good. Wines of various kinds stop the change of starch into sugar by the saliva, so that the habit that some persons have of sopping biscuits, bread, or spongecake in wine, and then eating them is not good. He found that proof spirit did not stop the action of the saliva on the starch, unless it rose to one-fifth of the food, but he shows that various spirits had a bad action, and that brandy and whiskey were the worst; brandy sauce will thus be seen to be harmful, as it prevents the saliva from acting on the food eaten.

The use of hot foods is injurious, as the heat destroys the active principle of the saliva; hot things do not get thoroughly masticated and mixed with saliva, and so are not prepared for stomach digestion. Hot foods also injure the teeth, crack the enamel, and cause premature decay; they also deaden the sense of taste, and we do not get all the pleasure from our food that we ought to do. This should be our rule—not to take hot foods or fluids even if we are very cold; the habit that country people have of pouring their tea, coffee, or cocoa out into their saucers until cool, is very good from a health point of view; it saves their teeth and stomachs. My own rule is to have my cocoa or hot water poured into the cup at the beginning of the meal, and I do not drink it until the end of the meal; then it is cool and does me no harm. I mentioned hot water in my last sentence. It is often my drink at meals. The cup is filled with boiling water when I begin breakfast or tea; it stands beside my plate until the end of the meal, and then I drink just as much as I like; the water has

become cool, and I quench my thirst with it. This plan has many advantages: the fluid is cool, the stomach does not get a false feeling of satisfaction from drinking before I have finished eating, and I only drink what I require. If cocoa is made I feel I must finish it, as I do not like to waste anything. Water is the best thirst quencher we have; custom soon leads us to like it.

DIGESTION IN THE STOMACH.

Before showing how food is digested in the stomach, I will give a few hints about food, that may be usefully inserted here. I always ask my readers and patients to stop as soon as satisfied, but what satisfaction is, I have not hitherto defined. If we take sloppy foods, we are soon satisfied; but if we eat solid and nearly uncooked foods we may be a long time before we experience that sensation. The plan is to eat our foods in as solid a condition as possible, and not to drink until we have finished eating, and then we are sure not to be far wrong. Or where we cannot trust our appetite, we must only allow ourselves that weight of food that experience has told us we can eat with comfort. If we are very hungry and want quick digestion, or our tissues are starved, or the assimilative organs are weak, then well-

cooked farinaceous foods supply us with nourishment very quickly. But if our work is laborious, heavy, and fatiguing, and if our meal-times are long between, then we need more solid foods, and ones that take some time to digest, such as porridge made from coarse meal, nuts, and such foods as Yorkshire, Norfolk, or batter puddings, also cheese. These foods are for labouring men, as they last him well; the student, and those delicate or weak of digestion, must avoid them.

Food in the stomach undergoes a different set of changes from what it does in the mouth. Now the nitrogenous part of the food is dissolved or digested, and made ready for being taken into the blood at a later period. The stomach is only a bag that retains the things put into it, until they are made fit for being taken into the blood; its capacity is a little over two pints. Nearest the gullet is a muscle which keeps this end closed, otherwise when we lie down the food would run out of the stomach into the mouth. It also prevents wind and

flatulence from readily leaving the stomach; certain articles of food by becoming sour in the stomach irritate this muscle, and it does not contract so steadily; then mouthfuls of the bitter stuff escape and return to the mouth. At the end nearest the bowels there is a projection of stomach substance, which acts as a flood-gate, and only lets the food pass over it when finely divided, or in matter as thick as pea soup. Were it not for this projection the food would escape into the bowels before being digested; it is called the pylorus. The walls of the stomach are lined by thousands of little glands which pour out a colourless fluid, which is called gastric juice. The fluid acts as a ferment or solvent, and breaks up all kinds of nitrogenous material, so that it may be easily absorbed and taken into the blood. The active principle of the gastric juice is called pepsin, and were this absent the food would lie in the stomach unchanged. Besides pepsin we find hydrochloric acid in small quantities. The use of this is to make the contents of the stomach acid, so that digestion may go on properly, as

this cannot occur if the contents of the stomach are alkaline. The alkalies are soda, potash, and lime, so that when persons take soda, potash, or lime water with milk they delay digestion, until the alkali has been neutralised by an excess of gastric juice. Cooking greens with soda is thus seen to be bad, whilst the use of baking powder and carbonate of soda in bread, biscuits, cakes, confectionery, &c., is very bad, as such delay or stop the digestion of foods in the stomach. As I have said in former articles, the hygienic housewife will never allow soda or baking powder in her kitchen.*

Gastric juice is a good destroyer of germs; were it not so, we should always have a good deal of stomach flatulence, as all the food we eat is swarming with germs, which fall into it from the air. When persons are weakly, and when there is a diseased state of the stomach and the gastric juice is weak, much wind forms, as then the gastric juice is either insufficient in quantity or not strong enough to destroy them.

* See Vol. III. of Essays.

When food has been taken into the stomach the two things that immediately occur are the absorption of excess fluid and the churning of the food itself. If the food has been properly masticated and some of its starch changed into sugar, then this is absorbed by the veins of the stomach, and helps to set up a feeling of satisfaction which then prevents us from over-eating, and so overtaking the powers of this organ. The food is slowly churned round and round, so that the gastric juice may get thoroughly mixed with it, and then as the food gets broken down by this fluid, it escapes over the pyloric projection. These two things go on together. If the food eaten be in too sloppy a condition, we get a feeling of satisfaction before we have eaten enough for our bodily wants, and are soon hungry again. Sloppy or too fluid food partly delays digestion, as the necessary changes cannot go on with energy if the contents of the stomach are too watery; the excess fluid has to be first absorbed. This teaches us the importance of eating our food in a semi-solid form; if we eat too much soup,

or have porridge and milk with it, or if we drink much whilst eating, we more or less delay digestion. To ensure the best digestion we must eat fairly solid foods, take little or no fluid with them, but drink at the end of the meal, or even an hour afterwards.

In the stomach the food is thoroughly broken down; what escapes the teeth is now further reduced to a kind of porridgy or pea soup mass. The fibres of flesh are broken and dissolved by the gastric juice; white of egg undergoes the same process. so does cheese, fish, and other albuminous substances. In other words the gastric juice changes animal and vegetable nitrogen into what are called peptones, which are then absorbed in the upper part of the intestines. Hence those persons who eat much fish, flesh, fowl, eggs, and cheese are more liable to suffer from stomach troubles than those who eat little of these foods. Dyspeptics must take these substances in great moderation if they wish to be well. . When **milk** is taken the gastric juice curdles it, the

stomach blood vessels absorb the whey, and the curd is then dissolved by the remaining gastric juice. As this curd may lie heavy if much milk is drank, I always advise patients who are on a milk diet to mix the milk with something else; that is why I order milk and barley water together, so that large lumps of curd may not form, and thus set up a feeling of weight in the stomach. Many persons find that milk lies heavily if they drink it, but mixed with bread in the form of bread and milk, or if the bread is sopped in it before being eaten, it can then only curdle in small quantities. and will not lie heavily. For this reason milk may be advantageously mixed with rice, sago, tapioca, macaroni, &c., and made into puddings. Those who drink milk should do so slowly, hold it in the mouth a little, mix with the saliva before swallowing, and then it will not cause much inconvenience. One of the best ways I know of taking milk is to sip it from a teaspoon.

In the stomach very little action is noticed

on the starchy or fatty foods; the fat is liquefied and floats on the top of the mass, and gets passed into the intestines unchanged. The thick pea soup like fluid resulting from the action of the gastric juice on the food eaten is called chyme. Sir William Roberts, whose name I have mentioned before, tested the influence of several drinks on the stomach digestion of foods. He found that pure spirits of wine had very little influence on digestion, unless taken in fairly large quantity, but that beer, porter, ale, stout, and such like drinks had a bad influence and retarded digestion; sherry and port did the same, and the strong spirits, like rum, brandy, gin, and whisky, were also perceptibly bad, except in small quantities. Tea and coffee are also bad, and, strange to say, delayed digestion as long as did the lighter wines. From these experiments we gather that all alcoholic fluids retard digestion more or less, and far from being useful and helping us to assimilate our food, they do harm; moderate drinkers should remember this. Tea and coffee are also bad; whether the tea is brewed two

or three minutes, or fifteen, makes no difference. Those who are fond of these fluids must profit by this advice and abstain from them if they suffer from slow digestion. Lastly, salt, which many think so necessary for the body, delays digestion as much as anything; and beef tea, which most people regard as a light food, retards digestion. Alkaline or acid drugs are also bad. Persons will do well to avoid all poisons, either concentrated or diluted.

I give below the time taken by various articles of food to become digested, or reduced to the pea soup mass named previously, in which condition they are emptied from the stomach into the bowels. These facts are obtained from the experiments of Dr. Beaumont, on Alexis St. Martin, who had an opening in his stomach caused by a gunshot wound, and Dr. Beaumont was able to test the time taken by various foods to digest and get cleared from the stomach. For reference sake I divide them into vegetable and animal:—

TIME OF DIGESTING VEGETARIAN FOODS.

FOOD.	TIME TAKEN.
Rice, boiled soft	1 hour
Ripe Raw Apples	1 hour 30 min.
Sago	1 hour 45 min.
Tapioca	2 hours
Barley	2 hours
Stale Bread	2 hours
Cabbage (raw) with vinegar	2 hours
Cold Milk	2 hours
Raw Eggs	2 hours
Bread and Milk (boiled)	2 hours
Potatoes (roasted)	2 hours
Parsnips (boiled)	2 hours
Custard (baked)	2 hours 45 min.
Apple Dumpling	3 hours
Eggs (soft boiled)	3 hours
Carrots (boiled)	3 hours 15 min.
Flour (baked)	3 hours 15 min.
Potatoes (boiled)	3 hours 30 min.
Turnips (boiled)	3 hours 30 min.
Butter	3 hours 30 min.
Cheese	3 hours 30 min.
Eggs (hard boiled or fried)	3 hours 30 min.

ANIMAL SUBSTANCES.

Tripe	1 hour
Pig's feet	1 hour
Venison (boiled)	1 hour 35 min.
Codfish (boiled)	2 hours
Turkey	2 hours 30 min.
Goose (boiled)	2 hours 30 min.
Lamb	2 hours 30 min.

Beef (roasted or boiled)	.	.	.	3 hours.
Mutton (roasted or boiled)	.	.	.	3 hours
Oysters (raw)	.	.	.	3 hours
Pork (fresh and boiled).	.	.	.	3 hours 30 min.
Oysters (stewed).	.	.	.	3 hours 30 min.
Ducks (roasted)	.	.	.	4 hours
Fowl, domestic (roasted)	.	.	.	4 hours
Fowl, wild	.	.	.	4 hours 30 min.
Pork (salted and boiled)	.	.	.	4 hours 30 min.
Suet	.	.	.	4 hours 30 min.
Veal (roasted)	.	.	.	5 hours 30 min.
Pork (roasted)	.	.	.	5 hours 30 min.
Beef (salted)	.	.	.	5 hours 30 min.

We can easily see from the above table how much more easy of digestion the vegetable foods are than the animal, so that those who suffer from indigestion or weak stomach will give the animal foods a wide berth. From the evidence of the lower part of the table my readers can now understand why I ask them to abstain from pork, veal, and salted things. Vegetable foods are not as thoroughly absorbed as are the animal fleshs, but they are much easier of digestion. It will be seen from the above table that raw oysters are not easier of digestion than fresh, boiled, or roasted meat.

DIGESTION IN THE INTESTINES.

As the food is digested in the stomach and reduced to the consistency of pea soup, it escapes over the pyloric projection into the upper part of the intestines, where it comes in contact with the bile and pancreatic juice. When the bile mixes with the chyme it converts some of the fat into a thin soap, which is then capable of passing into the lacteals or vessels which take it up, and empty it into a large vein of the body. Bile or gall, as most people know, is a dark green alkaline fluid, that has the power of forming soap when mixed with grease; renovators of old clothes know this, and make use of bullocks' gall for taking grease stains out of old garments. By means of the bile much of the fatty matter in our food is absorbed, and goes to nourish the body. Fat, when eaten as fat, grease, butter, or cream is not good food, as it is taken in excess of what the body

requires, and not in proper combination in natural foods. Thus I look upon the use of butter, cream, suet, lard, and oil as not in accordance with correct living; to put butter on bread is not a wise proceeding, and to put grease and fat in articles of food, or to fry or cook articles in fat, is far from being physiologically correct. Taking cod liver oil, cream, or olive oil for any disease causes a taxation of the digestive organs; fat may be put on the body, but that is not vitality, and the system wants this rather than fat. Those who wish to take fat in a natural condition that will be absorbed and do them good, may take milk in moderation, or eat walnuts, and Brazil or other nuts. When fat or oil is cooked it gets partly broken up in the process, and various irritating compounds are formed which injure the stomach, cause acidity, or mouthfuls of hot acrid and bitter stuff to come up. They also set up heartburn and wind in the stomach, and if the grease has been burned, or there is much of it, vomiting may occur. This is why persons who have weak stomachs, or are bilious, as they call it,

should avoid fatty foods and especially all fried foods and pie-crust. When persons take cod-liver oil, or other oily stuff, a good deal of it passes through the bowels unchanged, and helps to carry away some of the food before it has been digested. The colouring matter in the bile turns the contents of the bowels a darker colour, and gives to the motions their brownish appearance. When a person from some cause or other secretes very little bile, the motions are of a light yellow hue, and when a person has jaundice—that is, when no bile can get into the intestines—the motions are whitish and clay like. The other uses of the bile, besides changing fat into a kind of soap, are to prevent the food fermenting in the bowels, and some say to act also as a purgative. This secretion is thought to contain a good deal of waste matter, for if the bowels act daily, much of it must be got rid of, and so the system is kept in good order. When a person has jaundice the bile is absorbed again into the body, and is thrown out by the kidneys and perspiration, the water passed becomes like

porter, and the perspiration stains the clothes yellow; at the same time there is a most intolerable itching all over the body. If too much grease and fatty foods are eaten the bile becomes thicker, throws down some of its constituents, and gall stones are formed, which, as they pass through the gall duct, cause cold shivers intense pain, and violent sickness. Simple non greasy diet, with the free use of fresh fruit, will prevent these forming, or if formed will dissolve them again. When a person is violently sick, and throws up grass green fluid, it shows that bile has been forced from the bowels into the stomach, and from thence is vomited. The greenness of it is due to the alkaline bile becoming mixed with the acid secretions of the stomach.

The pancreatic juice is a fluid that mixes with the contents of the bowels some way below the bile duct; it is secreted by the pancreas or sweetbread, and its use is to continue the digestive process. This is a very important fluid, and finishes the process that the others began. It acts on starch, changing it

into sugar, like saliva; it dissolves nitrogenous matters like gastric juice; and emulsifies fats, like bile. Were it not for this secretion many of us would starve, as those who have ruined their stomachs and livers by the free use of intoxicants, tobacco, tea, coffee, hot fluids, and poisonous drugs are saved from death by this juice digesting the food which the stomach could not. By this wise provision of Nature those foods that pass our stomachs undigested must yet undergo another process before they are allowed to pass out of the bowels. Lower down the food is acted on by the succus entericus, or intestinal juice, which further assists in the digestion of anything that may have escaped the other fluids. When the chyme escapes from the stomach in the consistence of thick gruel, it is exposed to the absorptive or suction action of thousands of little points or projections, called villi, which take from it all the nutriment they can for our systems to use. In consequence of this action the food becomes more solid as it gets away from the stomach, until it passes from the bowels in quite a solid

mass. The walls of the bowels themselves contain muscles which contract and gradually force the food along from the stomach to the fundament, where it is expelled. When wind is formed in the bowels and distends them, and getting into some coil of the bowel, cannot be pushed along, it causes intense pain, which is called stomach ache or colic; this is often relieved by rubbing the abdomen with the hand, or by exercise, which pushes the wind on; for great relief is always experienced if it can be dispersed upwards or downwards. The length of the intestines is about 30 feet, and it takes our food nearly forty-eight hours to pass through this distance. The inside of the small intestines is lined by projections of the bowels. These are for a double purpose—to prevent the food hurrying along too fast, and to give more surface for the absorption of the nutriment. Gases, wind, or flatulence, form in the bowels from two causes, first, because germs of various kinds are always swallowed with our foods, and set up fermentation and the formation of gas; secondly, the digestive juices break up some of

the foods, gases form, and distend the bowels. The internal rumbling from which some people suffer, especially ladies, is due to the movement of fluid in the bowels. Those who suffer from it are in nearly all cases consumers of tea and coffee. These fluids are not readily absorbed, as they make the villi contract, and so this noise is caused by the fluid falling from one coil of the bowel to another.

The fæces or motions should consist only of innutritious matter which the digestive juices cannot dissolve. Practically much of our food passes through the bowels unacted on, because we do not thoroughly chew it, because we eat too much, and so cannot digest all we eat, or because we take injurious things with our foods that prevent them from being digested. When I lived only on wholemeal and water I digested 14 ozs. of every 16 ozs. of meal that I took, which I believe to be the best digestive performance on record. Usually we pass away at least one-fourth of the food we eat, and it does us no good. The body is nourished by the

amount we digest and absorb, and not by the amount we eat; those who eat little, but get all the available nourishment from food, are better fed than those who eat much and only digest part of it. This explains a fact I have often noticed, that by reducing the amount of food some people eat, I have enabled them to put on flesh. If we do not overtax our digestive organs they will serve us well, and last us a great many years; but if we cram them we wear them out and early come to grief.

In a healthy condition, the bowels will move once a day, and expel the unused or undigested food collected in the lower part of them. Two actions a day are not unhealthy, but more than this number is bad, and should be remedied by correct diet. Diarrhœa is that state of the bowels when they expel their contents three or more times in the twenty-four hours, and may result from many causes. The simplest cause is too much food, or any article that irritates the bowels; the cure for it is a cup of cool milk and barley water mixed in

equal proportions, taken every four hours until the diarrhœa ceases. All pills and purgative medicines cause diarrhœa; mankind has found out by experience that certain plants and minerals when swallowed have the power to cause the bowels to act quickly. The explanation of this action is that they so irritate the sensitive lining of the bowels, that it tries to expel them as quickly as they can. The result is that the poisonous drug and the food eaten are both expelled at the same time, and in consequence of this unloading of the bowels the person feels better for a temporary starve. If we examine the reasons for this fact we conclude that many people over-feed, and when they are dull, heavy, and ill in consequence they take some purgative which hurries all the food out of the bowels, and so helps to prevent further mischief. A more rational plan would be only to eat what the system requires, and then we should never need to resort to such violent means. Let us see what a purge does to the system. In the first place, it carries away the undigested food, and so persons often

feel weak after taking a pill or dose of medicine. Next, the stuff used irritates the whole intestinal tract, causes mild inflammation, and may set up what we call enteritis; in some cases violent purging and passing of blood with the motions follows, and permanent injury may result. Artificial purgation is always attended with pain in the bowels, and more or less constipation afterwards. Wise persons will not overeat, and will always take a fair amount of wholemeal bread, fruit and vegetables, so that the bowels will act daily without having recourse to purgatives. The least harmful mode of getting the bowels to move is by the enema syringe, which brings away the contents of the large bowel only, but does not disturb the digestive process higher up. Chronic diarrhoea is that condition of the bowels in which they move many times a day for months or years; there is always more or less inflammation of the lining of the bowel attending it. A simple diet of bread and milk will cure this in a few weeks, if the patient will adhere to it.

The motions should be of a brownish colour,

varying from light to dark brown, fairly solid, retain the shape of the lower bowel, and have a slightly offensive odour. When porridgy or very offensive, something is wrong. The smell which the motions have they only acquire at the lower part of the intestines, and this is like the concentrated perspiration of the person. Some think that because the stools contain flakes of bran, pieces of carrot, and currant skins, that these things are indigestible. This is a great mistake; in the case of the carrot and the currant it points to this fact—that the persons have swallowed them hastily, and without properly chewing them. The woody fibre of all plants and vegetables passes unchanged through the bowels, but the nourishment and salts contained in its meshes are dissolved out. A familiar simile of this is seen in the beer barrels which go into publican's cellars; they go in full, and come out empty, and when the full and empty barrels are standing side by side you cannot tell which is which by mere sight. It is only when you test them that you know which are full and which are empty.

So it is with healthy excreta; to look at, you think you are passing a great deal away, but when the chemist tests this he finds that nearly all the nutriment is gone, and mostly the refuse bran and husks left. To try and live on food that contains no refuse matter is most unphysiological, as our intestines are meant for acting upon food containing much innutritious matters: the daily excretion of which carries away bile and other excretions from our bodies, and so we keep well.

MISCELLANEOUS REMARKS.

I am frequently asked whether reading at meals is bad for digestion; to answer this properly, we must know what the reading is about. If a person eats a heavy meal and studies a philosophical or scientific book at the same time, and tries to remember its contents, then this habit will undoubtedly injure him, as intense thought and digestion cannot go on well at the same time; such reading is therefore not fit for meal times. But if the book is simply one of tales and travels, or if a newspaper or some light reading be indulged in, then no harm will result, as only a medium amount of blood is required by the brain for work of this kind. Talking at meals should not be indulged in very much, and heated arguments should never be allowed; certainly not whilst we are attempting to masticate our food, otherwise we

do wrong. We cannot thoroughly chew our food if we talk, besides which we may get so interested or excited that we neglect to eat a proper quantity. The wisest plan is to talk between the helpings or the courses, but not whilst actually engaged in eating. The conversation, too, should be light rather than learned. The meal time should be one of rest and contentment, if possible. The question of rest after taking food must not be forgotten. It is always best to remain quiet for half an hour or even an hour if possible after meals, so that the food may be partly digested before we draw blood from the stomach to other parts of the body. All of us know from experience that we do not feel inclined for much work of any kind directly after a meal, especially if it has been a heavy one. Those who are engaged all day at heavy work with the muscles, or whose brains are severely taxed all day will do well to take simple food in the middle of the day, and leave the heavier meal until evening, when the work is done, and when a quiet rest can be taken after it. At meal times we supply

ourselves with food for our work, it therefore behoves us to feed properly, and under the best conditions, if we desire to be properly nourished. It is related of John Hunter, the great surgeon, that one day at dinner he fed two dogs on suet dumplings; one of these he took out for a long run behind his carriage, whilst the other one was left at home sleeping on the hearth-rug. At the end of two or three hours he returned, killed both dogs and opened their stomachs. The food in that which stayed at home was all but digested and the stomach nearly empty, whilst that in the stomach of the dog which had taken the exercise was found to be in a hard mass that would take a long time to digest. The moral of this is to rest awhile after meals if possible; those who go out for bicycling and walking tours should not start directly after a meal, but allow the food to be fairly started in the digestive process before they take to the road again. Those who go in for contests of various kinds will do well to keep this in mind; they may have a fairly good meal two or three hours before the

trial of strength or endurance, and then they have most chance of success.

Some occasionally ask may they have many courses at dinner, or is it best to keep to only one or two? The best plan is to eat from as few dishes as possible; to dine from one course only is best, to have two courses is next best, but more than three are hurtful to the stomach. Persons who eat one course are less liable to overfeed than those who have two, and those who dine from two dishes will overfeed less than those who have three or more. At a grand or big feed the wise man will content himself with simple food, and go away from the feast uninjured; but he who partakes of everything must suffer next day from his overfeeding

IS VARIETY OF FOOD NEEDED?

An appropriate conclusion to these articles on diet and digestion must be the consideration of the question of variety in food. Most writers, both medical and otherwise, argue that man needs variety, and they say that such change is almost a necessity. I will now combat this, and show from analogy and experience that the less change the better for us in every way. Firstly, we will descend to the lower animals and lower orders of evolution or creation, and we find various creatures living entirely on one article of food, and never varying, unless circumstances make them. Thus we notice that the carnivorous animals keep to flesh eating, and are not particular as to the animal they eat, as long as it is food; cows, horses, sheep, and donkeys keep to grass-eating, and do not break into fields to get variety so long as they have

enough, though they will eat turnips, carrots, and potatoes, if given to them; birds keep to caterpillars, slugs, worms, and grain, whichever come easiest. When we descend lower down in the scale we find that each plant or tree has its particular insect; thus some moths live on nettles only, some on currant bushes only, some on ash trees, some on oaks, and some on beeches, and these insects never forsake their particular choice, provided there is plenty of that. We even find that on the same tree some live on the leaves, some on the bark, and some on the roots, and they keep to these special parts, and do not infest others. We thus can argue from comparison that every insect or animal has adapted itself to one kind of food, and is content with that, and thrives best on it. We find evidence of the same thing amongst mankind, in some few cases isolated individuals have kept to one kind of diet only, and when that food has been a proper one the persons have lived to a good old age, and have been free from disease. Dr. Felix Oswald mentions the case of a Russian.

malefactor who was put in prison at the age of twenty-two, and given black bread and water only, and he was not released until ninety. There is also the case of the miller of Bilericay, who lived for forty years chiefly on wholemeal porridge and milk. If we examine the records of persons who have lived to a good old age free from illness, we find their food has been very simple—potatoes, bread, Indian corn, or fruits and bread having been their chief food. The instances of misers and hermits bear me out in this. Their food is what some would call “dreadfully monotonous,” but very healthy notwithstanding. Now, persons who complain that they have no variety must content themselves with the knowledge that such is best, and that their trouble is really a blessing in disguise. Experience has shown me that those who are always having variety are also rarely healthily hungry. But those who live on a few simple foods are nearly always ready for them and always enjoy them.

Secondly, we must consider simplicity of diet

from an evolutionary or adaptation standpoint, for we find that when animals or men are confined to one class of food only, their organs and structures adapt themselves to that in time and so they thrive best on it. When we examine the mixed and varied foods that civilized men eat, we must know that we cannot have the best health, as so many foods act differently on the various organs; we cannot properly adapt ourselves to one class of substances, and so are never in good condition. It is like workmen. Keep them to one kind of work only and they become very skilful at it; but let them do a little of everything and they do nothing particularly well. Thus persons who live on meat only secrete one kind of gastric juice; those who live on fruit, nuts and grain secrete another kind; but he who tries to live on all secretes the two varieties and gets neither of the best. This is an argument for a non-flesh diet that is rarely used, but it is a powerful one nevertheless. Believing, as I do, that man has no right to flesh eating, I argue that a diet of fruits, roots, and grains is best for us, and if we keep to

a few kinds of these and have them constantly, our systems adapt themselves to such, and we get on well. But if we chop and change about from one food to another, and continually tax the various organs with unaccustomed work, we find that they will not act well.

MORAL.—Keep to a non-flesh diet, or begin to adopt it, and when you have done so, keep to as few kinds of fruits, nuts and grains as possible, cook them in the simplest and most wholesome way, interfere as little with them as possible, and then good digestion with health must be yours. Take the motto of Pythagoras for your own; it is “Do what is right, and custom will make it pleasant.”



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